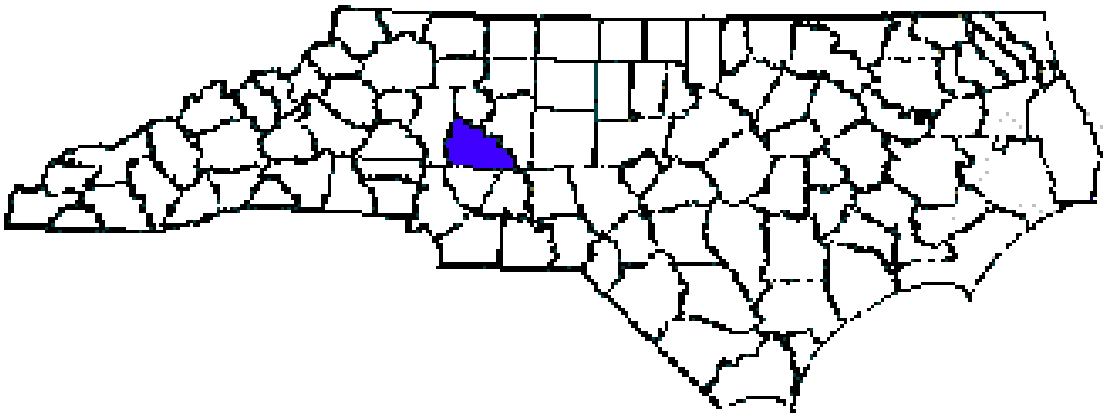
ANNUAL REPORT FOR 2008



UT Town Creek Mitigation Sites
Rowan County
TIP No. I-2511CA

Prepared By:
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North Carolina Department of Transportation
September 2008

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

SUMMARY

The following report summarizes the stream monitoring activities that have occurred during the Year 2008 at the UT Town Creek Stream Mitigation Sites (permitted Site #5 and Site #8) in Rowan County. The North Carolina Department of Transportation (NCDOT) constructed these sites during 2005. This report provides the monitoring results for the third formal year of monitoring (Year 2008). The Year 2008 monitoring period was the third of five scheduled years of monitoring on the UT Town Creek stream sites (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring at permitted Site #5 and Site #8 for UT Town Creek, they have both met the required monitoring protocols for the third formal year of monitoring. The channel throughout both the relocated stream sites are stable at this time. The stream bank and buffer areas are highly vegetated for the third year of monitoring. The buffer area at Site #5 was supplementally planted in February 2008 due to low survival of bareroot seedlings. The North Carolina Department of Transportation will continue stream monitoring at the UT Town Creek sites for 2009.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2008 at the UT Town Creek Stream Mitigation Sites. Site #5 is located on both the north and south sides of Interstate 85 on and adjacent to US 52 in Salisbury (Figure 1). The UT Town Creek Sites were constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number I-2511CA in Rowan County.

The mitigation sites provide approximately 1,691 linear feet of stream restoration. Construction was completed during 2005 by the North Carolina Department of Transportation (NCDOT). Stream restoration involved restoring sinuosity to the streams, sloping the adjacent streambanks to promote stability, and widening the floodplain to allow for major flood events. It also included the installation of coir fiber matting and live stakes along the streambank and bareroot seedlings in the buffer area.

1.2 Purpose

In order for a mitigation site to be considered successful, the site must meet the success criteria. This report details the monitoring in 2008 at the UT Town Creek mitigation sites. Hydrologic monitoring was not required for these sites.

1.3 Project History

December 2005	Construction Completed.
February 2006	Planted Live Stakes and Bareroot Seedlings
June 2006	Stream Channel Monitoring (1 yr.)
September 2007	Stream Channel Monitoring (2 yr.)
February 2008	Supplementally Planted Bareroot Seedlings (Site#5)
September 2008	Stream Channel Monitoring (3 yr.)

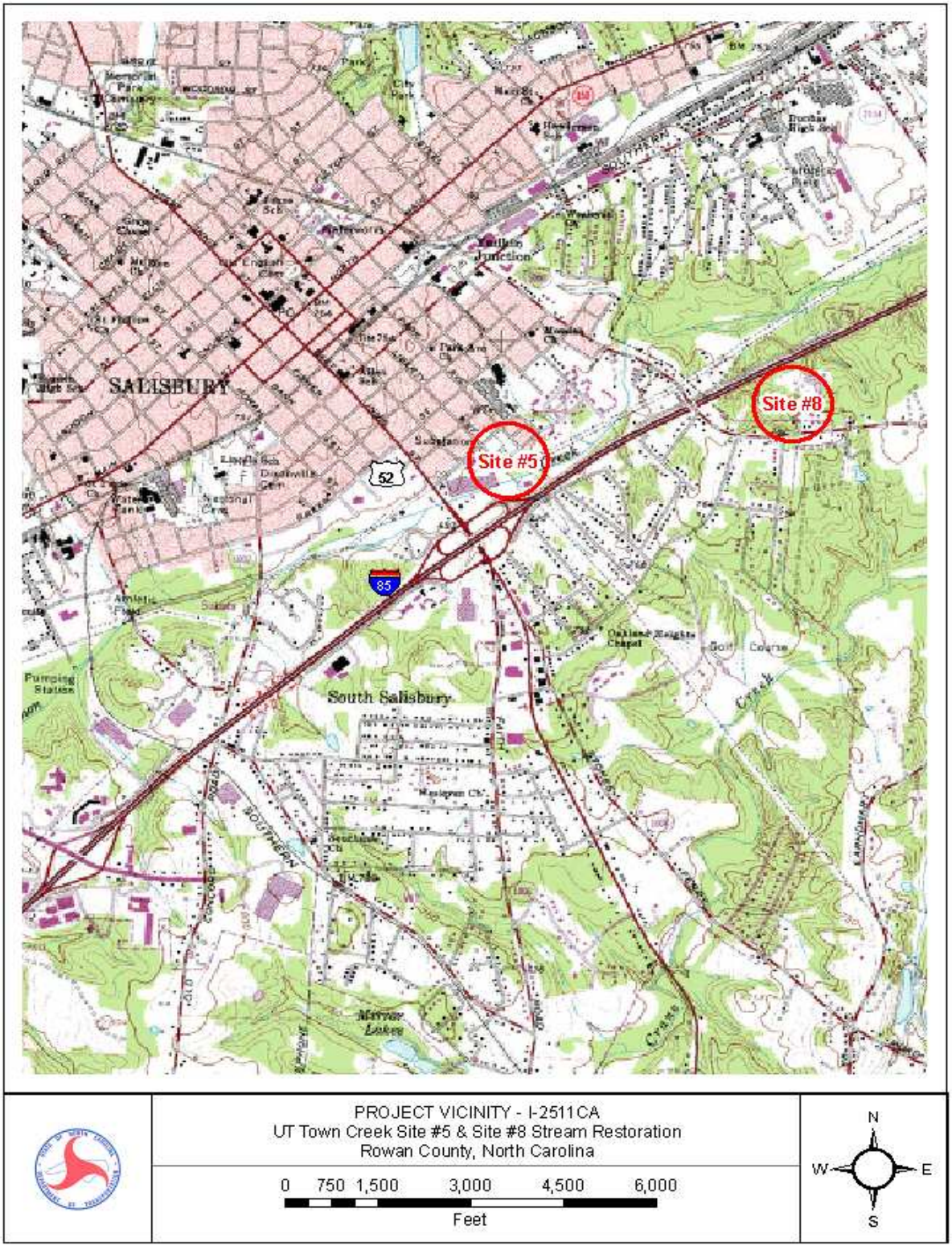


Figure 1. Vicinity Map

2.0 STREAM ASSESSMENT

2.1 Success Criteria

The following surveys were conducted in support of the monitoring assessment and in accordance with the regulatory permits obtained for this project:

Stream Geomorphological Assessment

- The stream shall be monitored for a duration of five years from the end of construction (channel modifications and vegetation planted)
- The data shall be collected and submitted to the US Army Corps of Engineers and N.C. Division of Water Quality no later than January 1st each year for five years after construction
- At Site #5, 1,276 linear feet of stream channel will be relocated. Two permanent cross sections shall be established in meanders of the channel and two permanent cross sections shall be established at inflection points in the channel
- At Site #8, 415 linear feet of stream will be relocated. A permanent cross section shall be established in a meander and at an inflection point along the channel
- In order to evaluate the stability of the new channel, the channel cross section at each permanent station identified above shall be measure on a yearly basis for five years and width:depth ratio compared to the as-built cross section

2.2 Stream Description

2.2.1 Post-Construction Conditions

The restoration of UT Town Creek Site #5 and Site #8 involved restoring sinuosity to the streams, sloping the adjacent streambanks to promote stability, and widening the floodplain to allow for major flood events. It also included the installation of coir fiber matting and live stakes along the streambank and bareroot seedlings in the buffer area throughout the entire reach.

2.2.2 Monitoring Conditions

The objective of the UT Town Creek Site #5 stream restoration was to build an E5 stream as identified in Rosgen's Applied River Morphology. A total of four cross sections (two in the riffles and two in the pools) were surveyed. At the UT Town Creek Site #8 stream restoration, the objective was to build an E5b stream as identified in Rosgen's Applied River Morphology. For this report, only cross sections containing riffles were used in the comparison of channel morphology presented below in Table 1 (Site #5) and Table 2 (Site #8).

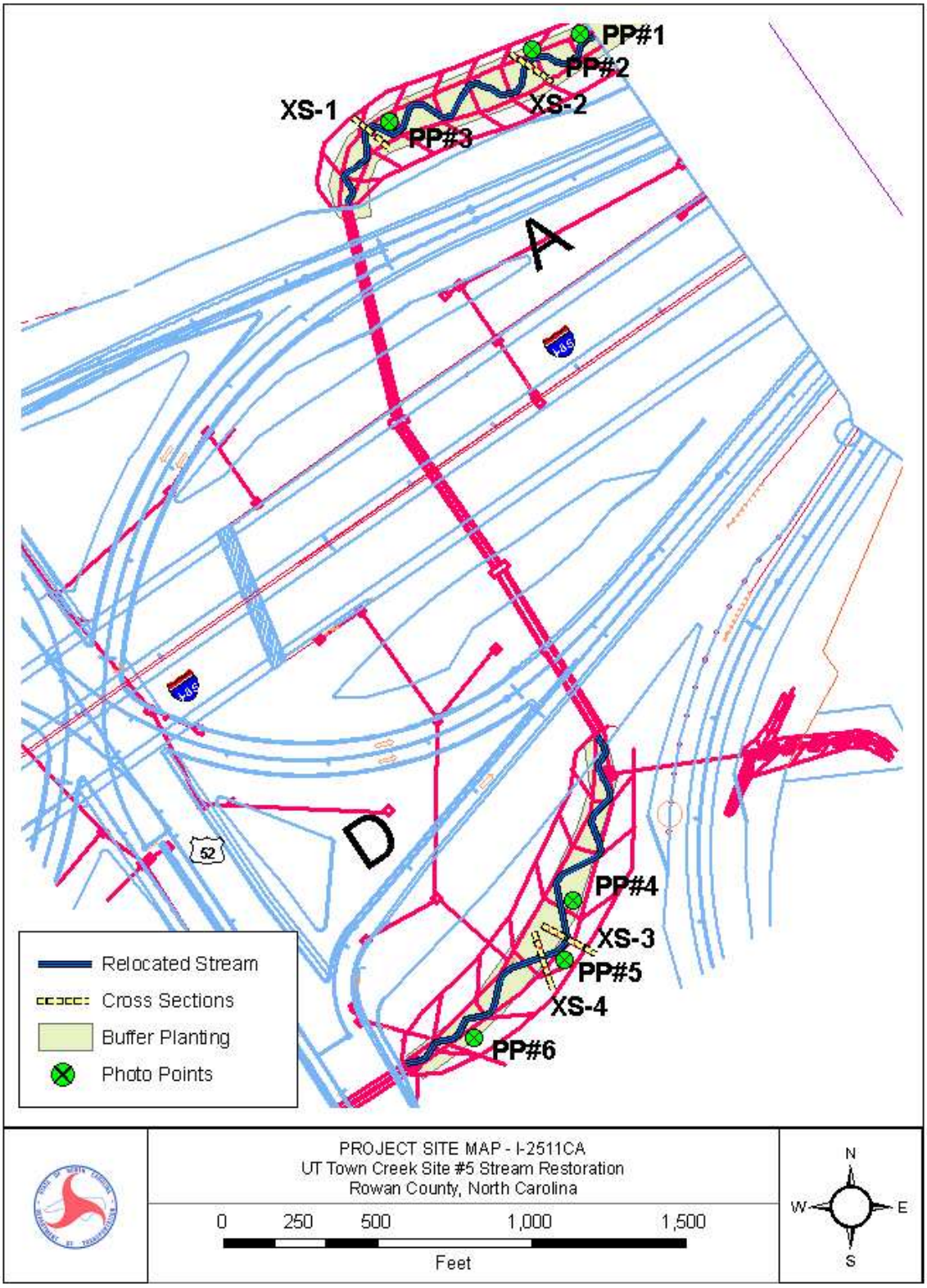


Figure 2. UT Town Creek Site #5 Map

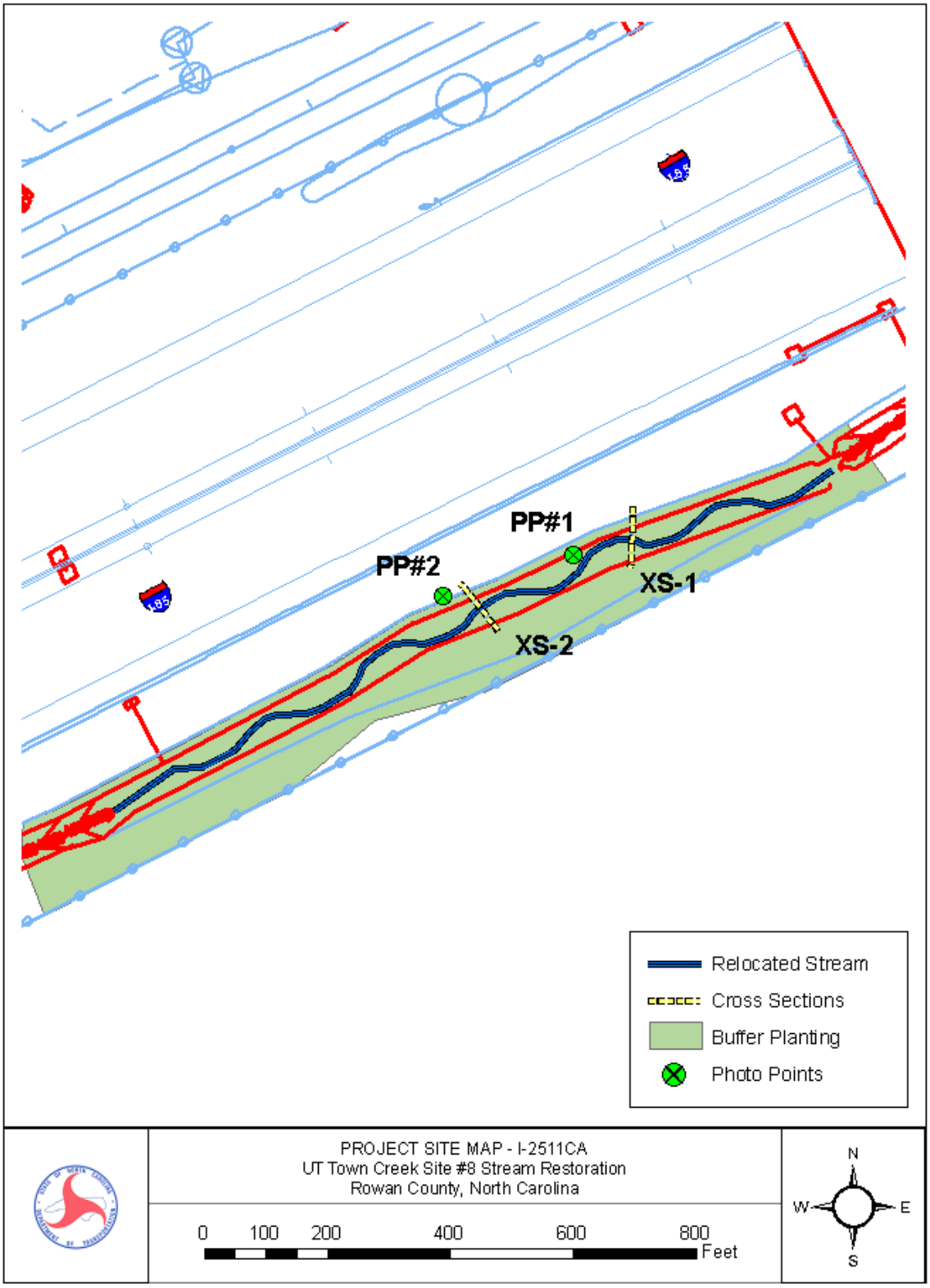


Figure 3. UT Town Creek Site #8 Map

Table 1. Abbreviated Morphological Summary (UT Town Creek Site #5)

Variable		2006	2007	2008	2009	2010
	Proposed	Riffle Cross-Section #2	Riffle Cross-Section #2	Riffle Cross-Section #2		
Drainage Area (mi^2)	0.31	0.31	0.31	0.31		
Bankfull Width (ft)	7.0	9.14	8.04	8.14		
Bankfull Mean Depth (ft)	1.1	0.79	0.69	0.67		
Width/Depth Ratio	6.4	11.57	11.65	12.15		
Bankfull Cross Sectional Area (ft^2)	6.0	7.24	5.51	5.46		
Maximum Bankfull Depth (ft)	1.5	1.24	1.17	1.16		
Width of Floodprone Area (ft)	17.0-41.0	34.6	21.3	21.3		
Entrenchment Ratio	2.4-5.9	3.79	2.65	2.62		

*Drainage Area, Floodprone Width, and Slope are averaged values only.
*Riffle values are used for classification purposes, pool values are shown in Appendix A.

Table 2. Abbreviated Morphological Summary (UT Town Creek Site #8)

Variable	Proposed	2006	2007	2008	2009	2010
		Riffle Cross-Section #1	Riffle Cross-Section #1	Riffle Cross-Section #1		
Drainage Area (mi^2)	0.02	0.02	0.02	0.02		
Bankfull Width (ft)	4.0	4.23	4.27	4.11		
Bankfull Mean Depth (ft)	0.8	0.62	0.62	0.72		
Width/Depth Ratio	5.0	6.82	6.89	5.71		
Bankfull Cross Sectional Area (ft^2)	2.3	2.62	2.67	2.94		
Maximum Bankfull Depth (ft)	1.0	1.05	1.1	1.22		
Width of Floodprone Area (ft)	13.0	13.02	14	14.0		
Entrenchment Ratio	3.25	3.08	3.28	3.41		

*Drainage Area, Floodprone Width, and Slope are averaged values only.
*Riffle values are used for classification purposes, pool values are shown in Appendix A.

2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the survey of four cross sections at Site #5 and two cross sections at Site #8. Longitudinal profile monitoring was not required per the permit conditions and therefore was not completed. All of the cross sections were established during the 2006 monitoring year. Cross section locations were determined based on choosing segments that were representative of the entire reach. The cross sections are shown in Appendix A.

Site #5 Cross-Sections:

- Cross-Section #1: UT Town Creek Site #5, Approx. Sta. 10+00 -Ramp A-, midpoint of pool
- Cross-Section #2: UT Town Creek Site #5, Approx. Sta. 8+50 -Ramp A-, midpoint of riffle
- Cross-Section #3: UT Town Creek Site #5, Approx. Sta. 11+00 -Ramp D-, midpoint of pool
- Cross-Section #4: UT Town Creek Site #5, Approx. Sta. 12+00 -Ramp D-, midpoint of riffle

Site #8 Cross-Sections:

- Cross-Section #1: UT Town Creek Site #8, Approx. Sta. 608+00 -L-, midpoint of riffle
- Cross-Section #2: UT Town Creek Site #8, Approx. Sta. 607+00 -L-, midpoint of pool

Based on comparisons of Year 2007 to Year 2008 monitoring data, all of the cross sections appear stable with little or no active bank erosion. Bankfull events had occurred at Site #5 and Site #8 since the last monitoring evaluation. Graphs of the cross sections are presented in Appendix A. Future survey data will vary depending on actual location of rod placement and alignment; however, this information should remain similar in appearance. Pebble counts were not required per the permit conditions and therefore were not completed.

3.0 Vegetation: I-2511CA Stream Sites #5 & #8

3.1 Description of Species

The following tree species were planted on the stream bank:

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

The following tree species were planted in the buffer area:

Betula nigra, River Birch

Platanus occidentalis, Sycamore

Prunus serotina, Black Cherry

Liquidambar styraciflua, Sweetgum

3.2 Results of Vegetation Monitoring

Streambank & Buffer Vegetation: The stream is highly vegetated throughout the channel with black willow, silky dogwood, river birch, swamp chestnut oak, willow oak, and tag alder. The buffer area at Site #5 was supplementally planted in 2008 due to low survival of bareroot seedlings. Site #5 was supplementally planted with River Birch, Swamp Chestnut Oak, and Willow Oak. Other vegetation noted along the channel included *Juncus* sp., woolgrass, green ash, cut grass, goldenrod, fennel, briars, wax myrtle, sedge, lespedeza, cattail, jewelweed, and various grasses. In accordance with the permit conditions, only visual monitoring of the stream and buffer vegetation is required therefore no vegetation plots were set at these sites.

3.3 Conclusions

There was no vegetation monitoring plots established throughout the buffer planting area. After the third year of monitoring, the UT Town Creek mitigation sites show by visual observation that the tree species planted in the streambank and buffer areas are surviving. NCDOT recommends continuing the visual vegetation monitoring of these sites.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The UT Town Creek mitigation sites have met the required monitoring protocols for the third formal year of monitoring. The channel and streambanks throughout both sites are stable at this time. The stream bank and buffer areas are vegetated for the third year of monitoring. The buffer area at Site #5 was supplementally planted on February 29, 2008 due to low survival of bareroot seedlings. NCDOT will continue monitoring the UT Town Creek mitigation sites in 2008.

5.0 REFERENCES

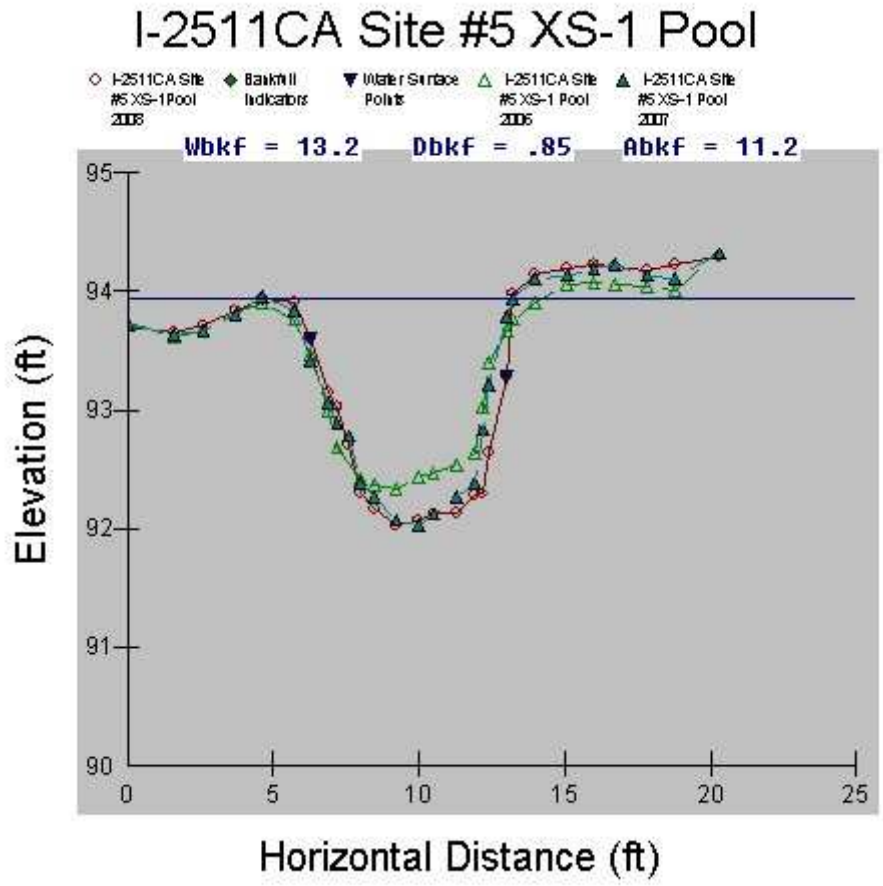
North Carolina Department of Transportation (NCDOT), November 7, 2000. Permit for I-2511CA.

Rosgen, D.L, 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. Prepared with cooperation from the US Environmental Protection Agency, NC Wildlife Resources Commission, and the NC Division of Water Quality.

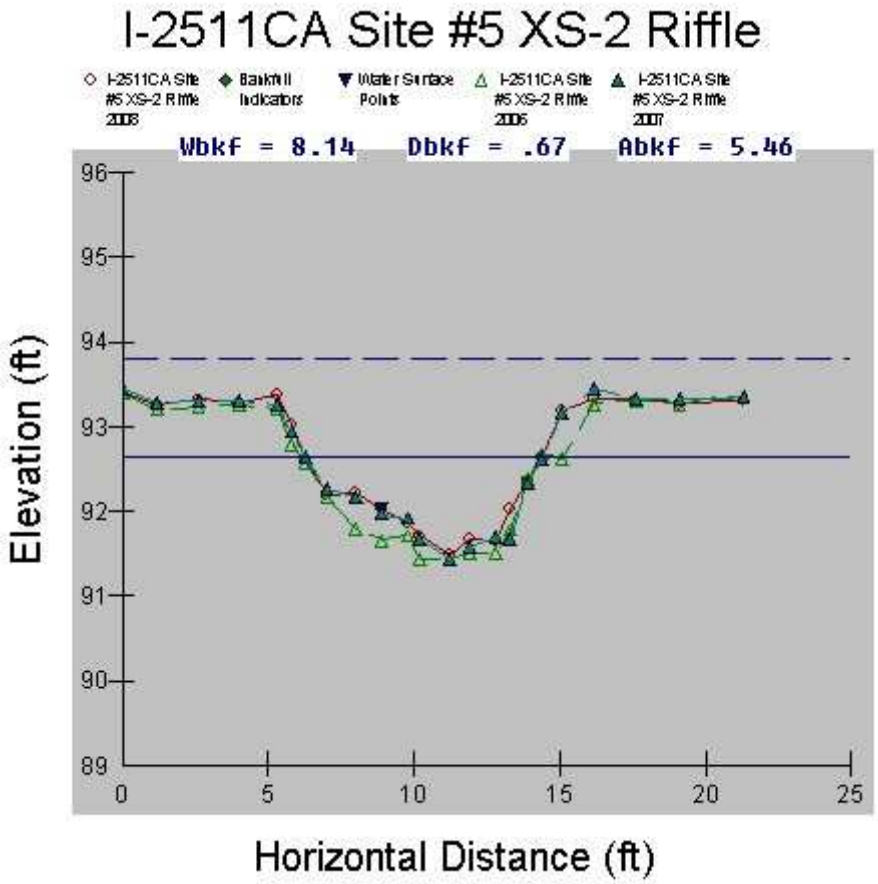
APPENDIX A

CROSS SECTIONS

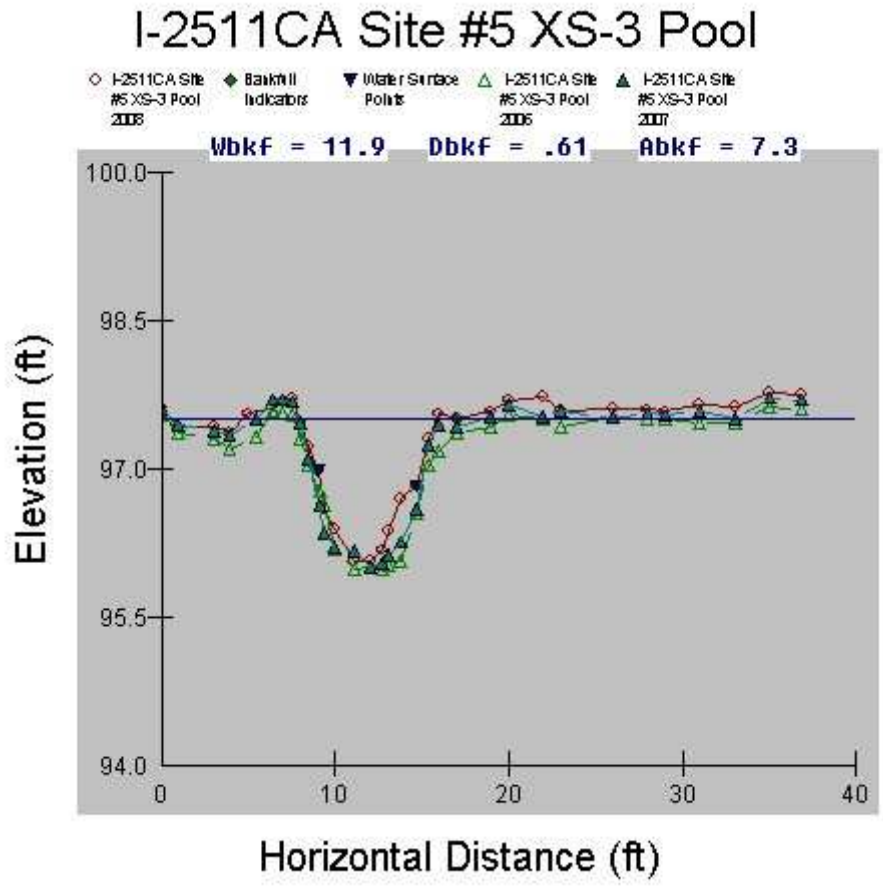


Site #5: Cross-Section #1 (Pool) Abbreviated Morphological Summary*					
	2006	2007	2008	2009	2010
Bankfull Cross Sectional Area (ft^2)	9.49	10.67	11.18		
Maximum Bankfull Depth (ft)	1.58	1.91	1.92		
Bankfull Mean Depth (ft)	0.68	0.82	0.85		
Bankfull Width (ft)	14.0	13.05	13.19		

* According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.

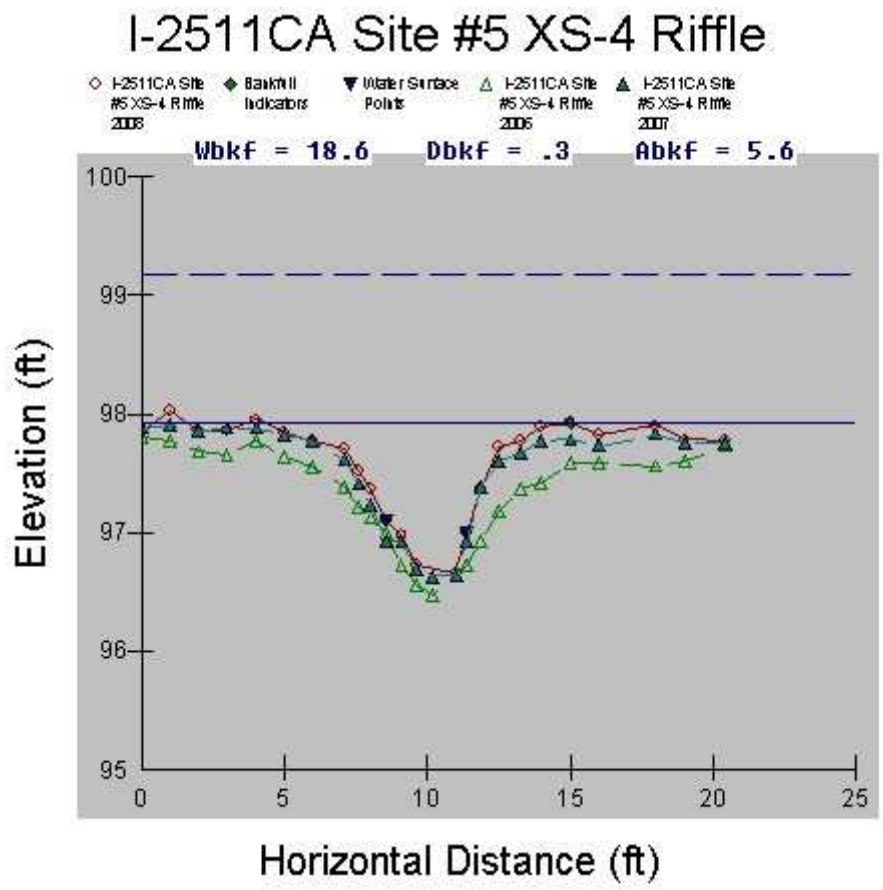


Site #5: Cross-Section #2 (Riffle) Abbreviated Morphological Summary					
	2006	2007	2008	2009	2010
Bankfull Cross Sectional Area (ft^2)	7.24	5.51	5.46		
Maximum Bankfull Depth (ft)	1.24	1.17	1.16		
Width of the Floodprone Area (ft)	34.6	21.3	21.3		
Bankfull Mean Depth (ft)	0.79	0.69	0.67		
Width/Depth Ratio	11.57	11.65	12.15		
Entrenchment Ratio	3.79	2.65	2.62		
Bankfull Width (ft)	9.14	8.04	8.14		

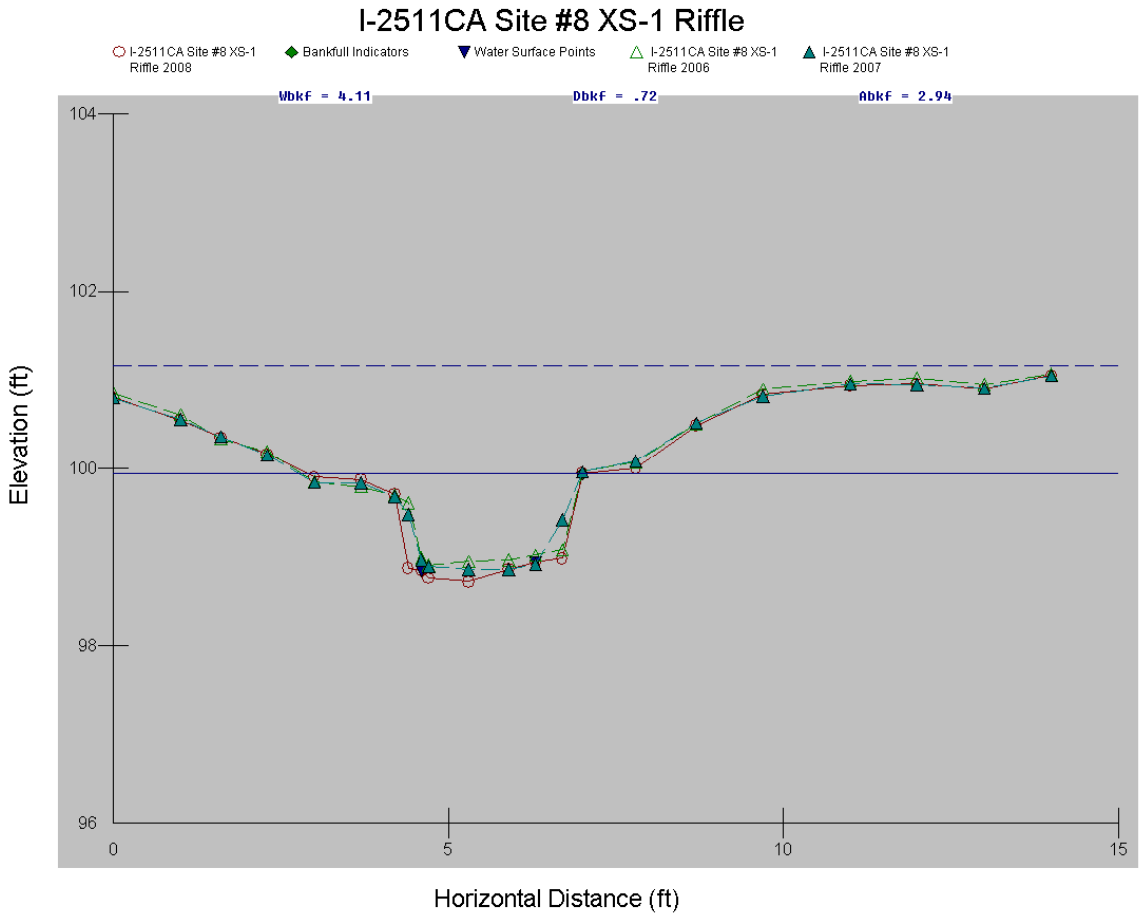


Site #5: Cross-Section #3 (Pool) Abbreviated Morphological Summary*					
	2006	2007	2008	2009	2010
Bankfull Cross Sectional Area (ft^2)	7.83	7.68	7.3		
Maximum Bankfull Depth (ft)	1.39	1.42	1.44		
Bankfull Mean Depth (ft)	0.86	0.72	0.61		
Bankfull Width (ft)	9.13	10.71	11.94		

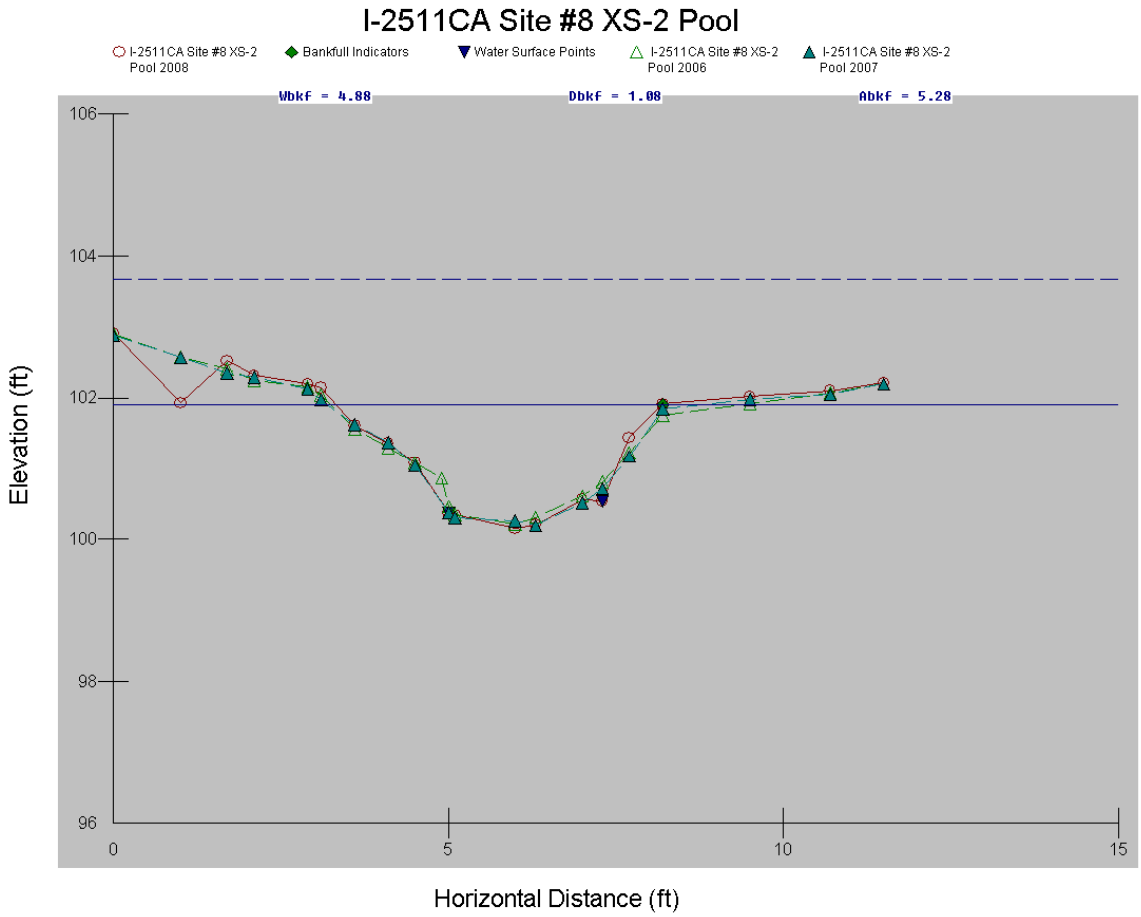
* According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.



Site #5: Cross-Section #4 (Riffle) Abbreviated Morphological Summary					
	2006	2007	2008	2009	2010
Bankfull Cross Sectional Area (ft^2)	4.65	4.48	5.06		
Maximum Bankfull Depth (ft)	1.12	1.15	1.26		
Width of the Floodprone Area (ft)	20.4	20.4	20.4		
Bankfull Mean Depth (ft)	0.50	0.35	0.3		
Width/Depth Ratio	19.27	37.09	25.89		
Entrenchment Ratio	2.16	1.57	1.79		
Bankfull Width (ft)	9.44	12.98	11.39		



Site #8: Cross-Section #1 (Riffle) Abbreviated Morphological Summary					
	2006	2007	2008	2009	2010
Bankfull Cross Sectional Area (ft^2)	2.62	2.67	2.94		
Maximum Bankfull Depth (ft)	1.05	1.10	1.22		
Width of the Floodprone Area (ft)	13.02	14	14		
Bankfull Mean Depth (ft)	0.62	0.62	0.72		
Width/Depth Ratio	6.82	6.89	5.71		
Entrenchment Ratio	3.08	3.28	3.41		
Bankfull Width (ft)	4.23	4.27	4.11		



Site #8: Cross-Section #2 (Pool) Abbreviated Morphological Summary*					
	2006	2007	2008	2009	2010
Bankfull Cross Sectional Area (ft^2)	4.42	5.05	5.28		
Maximum Bankfull Depth (ft)	1.55	1.66	1.76		
Bankfull Mean Depth (ft)	0.92	1.03	1.08		
Bankfull Width (ft)	4.81	4.93	4.88		

* According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.

APPENDIX B

SITE PHOTOGRAPHS

UT Town Creek Site #5

Photo Point #1 (Downstream)

Photo Point #1 (Upstream)

Photo Point #2 (Downstream)

Photo Point #2 (Upstream)

Photo Point #3 (Downstream)

Photo Point #3 (Upstream)

September 2008

UT Town Creek Site #5

Photo Point #4 (Downstream)

Photo Point #4 (Upstream)

Photo Point #5 (Downstream)

Photo Point #5 (Upstream)

Photo Point #6 (Downstream)
September 2008

Photo Point #6 (Upstream)

UT Town Creek Site #5

Photo Point #7 (Downstream)

Photo Point #7 (Upstream)

September 2008

UT Town Creek Site #8

Photo Point #1 (Downstream)

Photo Point #1 (Upstream)

Photo Point #2 (Downstream)

Photo Point #2 (Upstream)

September 2008